

POSITION/POSTURE SENSOR OR MARKER ATTACHMENT APPARATUS

FIELD OF THE INVENTION

[0001] The present invention relates to a technique for attachment of position/posture sensor used in an apparatus or system for providing an experience of virtual reality (VR) or mixed reality (MR) to an observer or player.

BACKGROUND OF THE INVENTION

[0002] Conventionally, an apparatus and a system for providing an experience of virtual reality (VR) or mixed reality (MR) (hereinafter, referred to as a "virtual reality system (VR-system)" and a "mixed reality system (MR-system)" respectively) generally perform processing utilizing position/posture information in a predetermined part of a player. For example, a position/posture sensor is attached to the player's hand, the position/posture information is obtained, and a virtual reality computer graphics (CG) object is displayed in a position of the player's hand, thereby the player feels as if a virtual-reality object exists in the position of the hand (e.g. on the hand).

[0003] The mixed reality system produces realism of virtual reality object in real space by overlaying a video image of real world and a CG (CG made by three-dimensional modeling) each other, positioning the both images with each other and displaying them.

[0004] As an apparatus for position/posture detection, FASTRAK (product name) by Polhemus, Inc. in the United States is known. This is a magnetic type position/posture detection apparatus having a magnetic emission device and a magnetic reception device (position/posture sensor). The position/posture sensor receives a magnetic wave emitted from the magnetic emission device to detect a position and a posture. The position/posture sensor is a small solid device of one-centimeter square. The sensor detects the spatial position (XYZ coordinates) and posture (roll, pitch and yaw) of the sensor. Conventionally, when the position/posture sensor is attached to a hand, the player wears a glove-like tool with the position/posture sensor.

[0005] However, as the conventional tool has a glove-like shape, most part of the hand is covered with the tool and the outlook of the tool causes an unnatural feeling. Especially when the tool is used in a mixed reality apparatus, as the player directly sees a video image of the hand, a visual problem occurs if the glove with the position/posture sensor is large. Further, the player cannot observe the hand itself.

[0006] To mitigate the above problems, the area of tool covering the hand may be reduced, however, attachment of the sensor becomes unstable, which increases measurement errors.

[0007] Further, in some mixed reality systems, a marker is attached to a real object, and the marker is image-recognized, thereby a CG image is overlay-displayed in the position of the marker. If the position/posture sensor and the marker are attached to the player's hand in such mixed reality system, the position/posture information detected by the position/posture sensor and the position/posture information obtained by recognition of the marker can be utilized in determination of the position of CG overlay display. This improves positioning accuracy.

[0008] The marker has a particular geometric shape, a particular color, or a pattern of combination of plural colors, for assisting image recognition. However, as the marker itself is also clearly recognizable for the observer, the marker in this mixed reality system provides an unnatural feeling to the observer.

[0009] On the other hand, in the virtual reality system and mixed reality system, sound is also important element as well as image. However, in the conventional systems, sound is reproduced from headphones which the observer wears, an external speaker or the like, regardless of the display position of virtual reality image. For example, even though a virtual image of explosion is displayed on a palm, the sound of explosion is reproduced from another place, which reduces realism. That is, there has been no virtual reality system or mixed reality system which reproduces sound related to a virtual reality image in the display position.

[0010] For example, if the display position (display portion) of virtual reality image is previously determined, a speaker may be attached to the position, however, actually, various problems occur. To display a virtual image in a position on the observer's hand and reproduce sound related to the virtual reality image in the display position, the speaker must be attached to the observer's hand. In this case, the speaker and the position/posture sensor are attached in proximity to each other. However, if a speaker using a magnet, a coil and the like is attached in the proximity of the magnetic position/posture sensor, the speaker influences the position/posture sensor and degrades the measurement accuracy.

[0011] In addition, as the speaker generally has metal parts, the metal pieces existing between the position/posture sensor as a magnetic reception device and the magnetic emission device degrade the measurement accuracy. Accordingly, there is a problem in attachment of the speaker in the proximity of the position/posture sensor.

SUMMARY OF THE INVENTION

[0012] The present invention has been made in view of the above conventional art, and has its object to enable attachment of the position/posture sensor and the speaker used in a virtual reality apparatus, a mixed reality apparatus and the like, in an appropriate state.

[0013] According to the present invention, a sensor attachment apparatus for at least attaching a sensor for detecting a position/posture of a hand, used in a virtual reality apparatus, a mixed reality apparatus or the like, comprising a first ring to which said sensor is attached, and a second ring to which a speaker is attached, wherein the first and second rings are connected by a band-shaped connection member.

[0014] Further objects, features and advantages of the present invention will become apparent from the following detailed description of embodiments of the present invention with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.